Code No.: **30413 / 40413**

MR13/MR14

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY - 2019

Subject: **Antennas and Wave Propagation**

Branch: **ECE**

Time: 3 hours **Max. Marks: 75**

PART – A

I. Answer **ALL** questions of the following **5x1Mark=5 Marks**

1. Define Directivity.
2. What is meant by uniform linear array?
3. Mention the types of reflectors.
4. Define wave absorption.
5. What is wave tilt?

II. Answer **ALL** questions of the following **10x2Marks=20 Marks**

1. What is meant by reciprocity theorem?
2. Define different types of aperture.
3. What is a dipole antenna?
4. Mention the types of horn antennas.
5. Write the characteristics of microstrip antennas.
6. Explain zoning briefly.
7. What is the need for binomial array?
8. What is the principle of pattern multiplication?
9. Differentiate reflection and refraction.
10. Define Tropospheric Propagation

PART-B

Answer **ALL** questions of the following **5x10 Marks= 50Marks**

1. Explain effective aperture area with its types in detail.

(OR)

2. Derive an expression for the power radiated by the current element and calculate the radiation resistance.
3. Explain the special features of various types of Horn antennas and frequency independent antennas.

(OR)

4. Discuss about horn antenna in detail.
5. Explain the radiation from a rectangular aperture.

(OR)

6. Describe the parabolic reflector used at micro frequencies.
7. Write short notes on a) Broad side arrays b) End fire arrays.

(OR)

8. Explain how the antenna radiation pattern is measured?
9. Determine the effective earth's radius in space wave propagation.

(OR)

10. Explain Maximum usable frequency and discuss the procedure to calculate MUF.

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III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY - 2019

Subject: **Analog Communications**

Branch: **ECE**

Time: 3 hours **Max. Marks: 75**

PART – A

I. Answer **ALL** questions of the following **5x1Mark=5 Marks**

1. What is multiplexing? What are their types?
2. Draw the spectrum of VSB modulated signal?
3. State Carson's Rule?
4. Define Average noise figure
5. Define Image frequency.

II. Answer **ALL** questions of the following **10x2Marks=20 Marks**

1. What is the need for modulation? Explain with necessary examples
2. Compare Square law detector with envelope detector
3. What are advantages of VSB modulation in television broadcasting?
4. Draw the spectrum of VSB modulated signal?
5. What is the relation between FM and PM waves?
6. Draw the block diagram of generating narrow band FM signal.
7. What is threshold effect in FM? How do you reduce the threshold?
8. Explain the terms pre-emphasis &de-emphasis?
9. Why there no cross-talk in Time Division Multiplexing?
10. What is meant by Intermediate Frequency? What are the commonly used Intermediate Frequencies in AM radio?

PART-B

Answer **ALL** questions of the following **5x10 Marks= 50Marks**

1. a) Explain the concept of square law modulator.
   b) Explain the concept of ring modulator.

OR

2. a) Define communication. Explain with block diagram the basic communication system. Write about modern communication system.
   b) A carrier wave of frequency 10 MHz and peak value of 10 V is amplitude modulated by a 5 KHz sine wave of amplitude 6 V. Determine the modulation index and draw the one Sided spectrum of modulation
3. a) Draw the block diagram of Weaver's method and describe its working principle by drawing spectra at various points.
   b) Describe how you generate VSB wave.

OR

4. a) Find the various frequency components and their amplitude in the Voltage given below $E=50(1+0.7\cos 5000t-0.3\cos 1000t)\sin 5\times 10^6 t$.
   b) Draw the single sided spectrum. Also evaluate the modulated and sideband powers.
5. a) Describe how do demodulate FM signal using frequency discriminator.
   b) Determine the relative power of the carrier & side frequencies when $\beta=0.20$ for 10kW FM transmitter.[7]

OR

6. The equation of an angle modulated voltage is v(t) 10 sin 10^8t + 3 sin 10^4t. What form of angle modulation is this? Calculate the carrier and modulating frequencies, the modulation index and deviation and the power dissipated in a 100Ω resistor?
7. Derive the equation for noise figure of AM receiver using an envelope detector. Hence prove that the noise performance of an AM receiver is inferior to DSBSC or SSB.

OR

8. Derive the equation of figure of merit of AM receiver and DSB receiver.
9. a) Draw the block diagram TDM and explain its working principle.
   b) What is difference between synchronous and asynchronous TDM? What is bit stuffing? [7+3]

OR

10. Explain about: i) Sensitivity ii) Selectivity iii) Fidelity iv) Image rejection ratio v) AGC

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MR13/MR14

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III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY - 2019

Subject: **Control Systems**

Branch: **Common to EEE & ECE**

Time: 3 hours **Max. Marks: 75**

PART – A

I. Answer **ALL** questions of the following **5x1Mark=5 Marks**

1. Give an example for open loop and closed loop control system.
2. What is 'Type' of the system?
3. What is the sufficient condition for stability?
4. What is the need for compensator?
5. What are state variables?

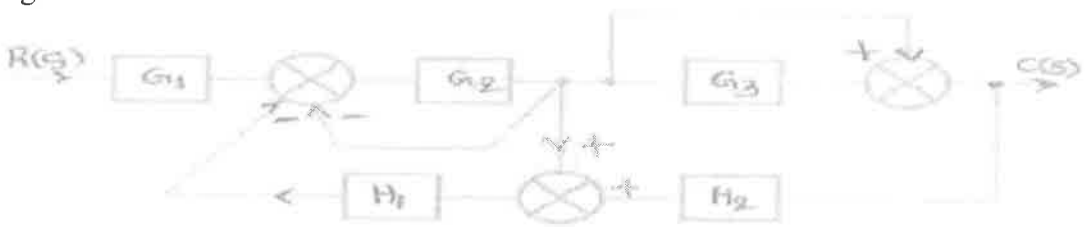
II. Answer **ALL** questions of the following **10x2Marks=20 Marks**

1. Explain Mason's Gain Formula.
2. What are the advantages and disadvantages of feedback in control systems?
3. Find the unit impulse response of $H(s) = \frac{5s}{(s+2)}$) with zero initial conditions.
4. Define position error constant and velocity error constant.
5. Distinguish between absolute and marginal stability
6. Write the necessary conditions for Routh Hurwitz criteria.
7. What is correlation between phase margin and damping factor?
8. Write short notes on P I, and HD controllers.
9. State the terms controllability and observability.
10. Draw the block diagram of state model.

PART-B

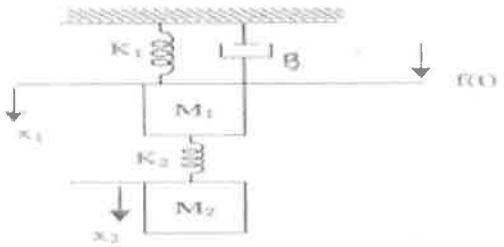
Answer **ALL** questions of the following **5x10 Marks= 50Marks**

1. Draw the signal flow graph for the block diagram given below and obtain the transfer function using Mason's gain formula.



OR

2. a) Define transfer function and discuss its limitations.
   b) Derive the Transfer Function X(s) /F(s), for the mechanical system shown below:[i. e. $X_1(s)/F(s)$]



3. a) A unity feedback control system has an amplifier with gain K_A=16 and gain ratio, $G(s)=\frac{1}{s(s+4)}$ in the forward path. A derivative feedback, $H(s)=sk_0$. Determine K_0, so that the damping ratio is 0.5.

   b) What is the effect of derivative control on damping ratio, peak overshoot and rise time?

OR

4. What are the different time domain specifications of a dynamical system? Explain important specifications of a second ordered system to unit step input.

5. Draw the root locus for the system with $G(s)H(s) = \frac{K(s+5)}{s(s+1)(s+2)}$. Determine the value of K and comment on stability.

OR

6. a) Explain the Relative stability.

   b) The open loop transfer function of a unity feedback system is $G(s)H(s)=\frac{s+2}{(s+1)(s-1)}$ Comment on the stability.

7. For G(S) =K/[S(S+2) (S+20)]. Design a lag compensator given phase margin $\geq 35^0$ and $K_v \leq 20$.

OR

8. Using Bode plot, Determine the gain margin and phase margin of the system with open loop transfer function $G(s) = \frac{10}{s(1+0.1s)(1+0.2s)}$

9. A linear time invariant system is denoted by the differential equation $D^3 + 3D^2 + 3D + y = U$

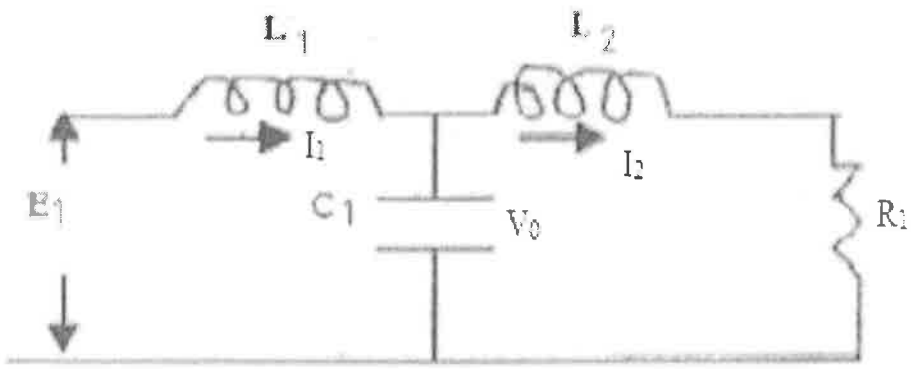
   Where D = dy/dt (i) Write the state equations. (ii) Find the state Transition matrix.

   (iii) Find the characteristic equation and Eigen values of A.

OR

10. a) Define the terms: (i) State variable (ii) State transition matrix.

    b) Obtain the state equation and output equation of the electric network as shown in figure below.



Code No.: **30412/40412** | **MR13/MR14**

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III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY - 2019

Subject: **Linear & Digital IC Applications**

Branch: **EEE & ECE**

Time: 3 hours **Max. Marks: 75**

PART – A

I. Answer **ALL** questions of the following **5x1Mark=5 Marks**

1. Define input offset voltage.
2. What is an instrumentation amplifier?
3. What does PLL mean?
4. What is the main drawback of a dual-slope ADC?
5. Draw basic CMOS NAND gate?

II. Answer **ALL** questions of the following **10x2Marks=20 Marks**

1. Define Operational Amplifier. Draw internal block diagram of Operational Amplifier
2. What are the areas of application of non-linear op-amp circuits?
3. Why do we use higher order filters? Give any two reasons.
4. What is an switching regulator?
5. Explain why NMOS transistor produces weak '1' and PMOS transistor produces weak '0'?
6. Convert RS Flip-Flop to JK Flip-Flop.
7. List out the direct type ADCs.
8. Mention some areas where PLL is widely used.
9. Compare integrator and differentiator.
10. Explain briefly about AC Characteristics of op-amp.

PART-B

Answer **ALL** questions of the following **5x10 Marks= 50Marks**

1. a) What is an ideal Op-Amp? List the characteristics of it. **(4M)**
   b) Explain the equivalent circuit of an op-amp. What is ideal voltage transfer curve? **(6M)**

OR

2. a) Draw the pin diagram and schematic symbol of a typical OP-AMP IC 741 and explain the function of each pin?
   b) Explain how dual supply operation is obtained from single supply connection?
3. Explain in detail of a basic differential amplifier

OR

4. a) Sketch and explain the circuit operation of log amplifiers. Calculate output voltages for a given input and show how temperature dependence is minimized.
   b) With the help of a neat circuit diagram, explain the operation of a three op-amp instrumentation amplifier and obtain the expression for its output voltage?
5. Explain working of PLL using appropriate block diagram and explain any one application of the same.

OR

6. a) Discuss about the design of All-pass filters.
   b) Design a second order low-pass Butterworth filter with a cut-off frequency of 12KHz and unity gain at low frequency. Also determine the voltage transfer function magnitude in dB at 15Hz for the filter
7. a) Explain the functional block diagram of IC723 regulator.
   b) Design a current limit circuit for a IC 723 regulator to limit the current to 60 mA.

OR

8. With neat sketch explain the working of a flash type ADC.
9. a) Sketch the logic diagram equivalent to the internal structure of an 2 input CMOS NAND gate.
   b) Implement ABC' + AB'C + A'BC' using a 3 to 8 decoder.

OR

10. Design CMOS transistor circuit for 2-input OR gate. Explain the circuit with the help of function table?